

Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

4. National Park Service Certification

I hereby certify that this property is:

- entered in the National Register
- determined eligible for the National Register
- determined not eligible for the National Register
- removed from the National Register
- other (explain:) _____

Signature of the Keeper

Date of Action

5. Classification

Ownership of Property

(Check as many boxes as apply.)

- Private:
- Public – Local
- Public – State
- Public – Federal

Category of Property

(Check only **one** box.)

- Building(s)
- District
- Site
- Structure
- Object

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Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing	Noncontributing	
_____	_____	buildings
_____	_____	sites
<u>1</u>	_____	structures
_____	_____	objects
<u>1</u>	_____	Total

Number of contributing resources previously listed in the National Register _____

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6. Function or Use

Historic Functions

(Enter categories from instructions.)

Transportation / road-related (vehicular), bridge

Current Functions

(Enter categories from instructions.)

Transportation / road-related (vehicular), bridge

7. Description

Architectural Classification

(Enter categories from instructions.)

Bridge

Materials: (enter categories from instructions.)

Principal exterior materials of the property: Concrete

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Narrative Description

(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with a **summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

The Kapalama Canal Bridge is a five-span, reinforced concrete tee-beam bridge located in Honolulu, on the island of Oahu. It carries Dillingham Boulevard over the Kapalama Drainage Canal. This 1930 bridge has a parapet design featuring narrow arched-top voids; a parapet design that first appeared on Oahu bridges ca. 1930 and was in use during the period between the earlier solid concrete parapets, which were typically in use during the 1920s, and the later parapets with cross-shaped voids that appeared ca. 1936. The bridge is about 113 feet in length, divided into five spans. The individual span lengths of approximately 22 feet is among the shorter span lengths for tee-beam bridges in Hawaii. Its overall length is somewhat typical, with at least four known tee-beam bridges on Oahu with longer overall spans. The bridge appears to be in fair condition, with few alterations (besides resurfacing of the roadway) since its construction.

Narrative Description

The Kapalama Canal Bridge is a reinforced concrete tee beam bridge that carries Dillingham Boulevard, an asphalt surfaced roadway approximately 56 feet wide, over the Kapalama Drainage Canal. At both sides of the roadway crossing the bridge are 9'-10" wide concrete walkways set about 5 inches higher than the roadway, which form curbs. The bridge has five spans of about 22'-6" each, for a total length of about 113 feet.

At the ends of the parapets are concrete end stanchions, which are rectangular in plan and elevation. The end stanchions are 4'-6" wide, 2' thick, and 3'-4" high with a 9" high base and an 8" high cap. On the top of the cap, set about 2" in from the edge is a low-sloped hip, about 1½" high at its highest point, or "ridge". Between the base and top cap, the vertical sides of the end stanchions are inset about 3". The three sides of the end stanchions not facing the parapet each have inset panels, the front and back panels are 3'-5" x 1'-3" and the side panel is 1' x 1'-2". The same low-sloped hip shape found on the top of the caps is also inset within the rear and side panels. Typically, concrete bridges of this type and period have date and name inscriptions on their end stanchions. Here, "Kapalama Canal" is on the front panels of the northeast and southwest stanchions. On the front panels of the northwest and southeast stanchions is the date "1930". The incised block letters of the inscriptions are about 3" high.

The top of the cap of each end stanchion has been partially re-surfaced with concrete. The southeast stanchion has a portion of this added concrete chipped away to reveal that a steel pipe with an inside diameter of about 2" is imbedded vertically in the center of the stanchion.

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The concrete parapets of the bridge are about 3'-1" high with a bottom rail measuring 9" high by 1'-6" wide, and a top rail that is 6" high and 1' wide. The upper surface of the top rail is slightly peaked. Between these rails are 6" thick 1'-10" high concrete panels that are perforated with narrow arched openings. These openings are spaced at 1' on center (o.c.), with each measuring 6½" wide and 1'-2" high. Along the length of the parapet are four rectangular stanchions which are 2'-9" wide, 2' thick, and about 3'-3" high. These stanchions have an 8" high cap with a hip-bevel decoration raised about 1½" above the cap. The inboard and outboard faces of the stanchions have 1'-8" x 1'-2" inset panels with a hip-bevel decoration.

The substructure of the Kapalama Canal Bridge consists of concrete abutments and masonry wing walls with coursed, quarry-faced basalt lava rock set in concrete mortar. At some sections of the wing walls, such as at the southwest, the mortar joints are raised in a v-profile. The four bents of the bridge are concrete transverse beams with beveled ends. Each transverse beam is supported by about fourteen concrete, square-section piles that are driven down into the stream bed. The transverse beams in turn support the longitudinal concrete beams of the bridge superstructure.

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Site Information:

The Kapalama Canal Bridge is located along a well-traveled commercial section of Dillingham Boulevard. East of the bridge is the campus of Honolulu Community College. A strip mall lies to the south, and a used car lot to the north. Kapalama Shopping Center is located about 1 block northwest of the bridge. The setting around the bridge has changed greatly since its construction. At that time, the area around it was vacant; the land fronting Dillingham Boulevard between about Waiakamilo Road and what would become Alakawa Street was undeveloped.

Integrity Assessment

The location of the property has not changed. The Kapalama Canal Bridge is in its original location.

The setting of the property has changed. When the bridge was constructed, the surrounding area, including the land between the former Kapiolani and Bishop Estate tracts to the west, and the commercial area of Iwilei to the east, was vacant. No buildings existed along Dillingham Boulevard from (what would become) Alakawa Street westward, almost to Waiakamilo Road. Now the area has dense commercial development. Integrity of setting is not retained.

The design, materials, and workmanship of the property are retained. The historic character of the bridge's stanchions and parapet is still apparent. They retain sufficient integrity of their original form (design), physical elements (materials), and evidence of skill (workmanship) employed in their construction, to allow the bridge to reflect its historic appearance. Besides road resurfacing, the only noticeable alteration is the removal of vertical metal poles that once projected up from the end stanchions.

The feeling and association of the property are largely retained. Although changes to the setting have somewhat degraded the bridge's ability to communicate its identity, the bridge still expresses the historic sense of the time of its construction. The bridge is sufficiently intact to convey its association with the important highway improvements of that period.

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8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- B. Property is associated with the lives of persons significant in our past.
- C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- D. Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations

(Mark "x" in all the boxes that apply.)

- A. Owned by a religious institution or used for religious purposes
- B. Removed from its original location
- C. A birthplace or grave
- D. A cemetery
- E. A reconstructed building, object, or structure
- F. A commemorative property
- G. Less than 50 years old or achieving significance within the past 50 years

Areas of Significance

(Enter categories from instructions.)

Transportation

Period of Significance

1930-1949

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Significant Dates

1930

Significant Person

(Complete only if Criterion B is marked above.)

Cultural Affiliation

Architect/Builder

Daniel Balch, Assistant City and County of Honolulu Engineer
George K. Dawson, City and County of Honolulu Engineer

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Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

The 1930 Kapalama Canal Bridge is significant at the local level under Criterion A for its contribution to the development of an effective road transportation system on O'ahu; as part of Dillingham Boulevard, an important arterial in Honolulu's urban core. The bridge facilitated passage along the boulevard through the Kapalama area and provided an improved linkage between Honolulu's downtown, the port area, and points west to Pearl Harbor. The property's significance in the area of transportation (Dillingham Boulevard) is for the period from the 1930 bridge construction through 1949, when Nimitz Highway replaced Dillingham Boulevard as the main corridor in this vicinity. Between those dates, the bridge was a critical element of the main transportation route from downtown to Pearl Harbor, and other points west.

Narrative Statement of Significance (Provide at least **one** paragraph for each area of significance.)

The Kapalama Canal Bridge is significant at the local level under Criterion A as a part of the extension of Dillingham Boulevard from downtown Honolulu through the Kapalama area to the residential area centered at Kalihi Street, and further west to Pearl Harbor. The Kapalama Canal Bridge was built by the City and County of Honolulu in 1930 in conjunction with the construction of the section of Dillingham Boulevard between Waiakamilo Road and King Street. Engineers working on the project were Assistant City and County Engineer Daniel Balch and structural engineer George Dawson.¹

The construction of Kapalama Canal Bridge in 1930 and the development of Dillingham Boulevard opened the entire tract of land between King Street and Waiakamilo Road for development, as well as providing a direct route from downtown to Pearl Harbor and other points west, including the John Rodgers Airport, which opened in March 1927. The Kapalama Canal Bridge and the connection of Dillingham Boulevard to North King Street in 1930 created better access to downtown for the Kapiolani Tract, the Bishop Estate Tract, and the planned industrial subdivision in the Kapalama area. The Kapalama industrial area could not be developed until the Kapalama Drainage Canal was completed in 1939. A December 1935 newspaper article reported on a small boom in residential development that was occurring on the *makai* side of Dillingham Boulevard, despite the Great Depression.² Numerous elements, including the draining of the area, the construction of the bridge and road, and the subsequent construction of the Kapalama Canal, were necessary for the transformation of Kapalama - from wetlands to buildable acreage - to take place. An aerial photograph dated 1963 shows that by this time, nearly all of the parcels surrounding the Kapalama Canal Bridge were fully developed, which marked the culmination of the development of an industrial district that was envisioned nearly four decades earlier.³

¹ Bethany Thompson, Historic Bridge Inventory, Island Of Oahu. Honolulu: State of Hawaii Department of Transportation, Highways Division. June 1983. pp. VII-13.

² "Little America," December 4, 1935 article in the University of Hawaii, Hamilton Library, Honolulu Newspapers Clippings Morgue, on microfiche in Subject section under: Dillingham Boulevard. .

³ Hawaii State Archives, Folder PPA-48-3, photo EKM-2CC-206. January 12, 1963.

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History of the Kapalama Area

The Kapalama Canal Bridge is located within the Kapalama ahupua'a.⁴ In the Hawaiian language, Kapalama means "the enclosure of lama." In Hawaiian, *lama* means light, as in enlightenment and palama refers to a compound, enclosed by sacred lama wood.⁵ Lama also was used to describe the enlightenment found through dance. By legend, such an enclosure was located there, hence the name.⁶

At the time of the Mahele,⁷ ca. 1850, the terraced area of Kapalama that extended from the edge of the sea to the foothills (above what would become School Street) was planted in taro.⁸ Two streams, Niuhelewai Stream and Kapalama Stream drained this area. Kapalama Stream extended mauka⁹ on a route running just east of Waiakamilo Road / Houghtailing Street before crossing west near H1 Freeway to extend up Kalihi Valley east of Kalihi Street. Niuhelewai Stream was about one-half-mile east of Kapalama Stream, extending up to a spring located just makai of (future) School Street. This spring was west of Lanakila Street and just across School Street from the former Insane Asylum (now the site of Hawaii Public Housing Authority). Near (former) Vineyard Boulevard (now Halona Street / H1 Freeway), a branch of Niuhelewai Stream extended northwest, crossing School Street near Houghtailing and meandering mauka. Niuhelewai is described in Place Names of Hawaii as "Old part of Honolulu, site of a battle in which Ka-hekili of Maui defeated Ka-hahana of O'ahu; a stream here was choked with corpses."¹⁰

By the late 1800s, rice was planted in Kapalama surrounding the site of the future bridge.¹¹ Pineapples were planted farther west, near what would become Kalihi Street. To the east, the area of Iwilei was an industrial site near the edge of downtown Honolulu that contained a fertilizer works, a slaughterhouse, and a prison. King Street was the only east-west road through Kapalama and the Oahu Railway & Land Co. (OR&L) main line ran just makai of King Street. By 1912, School Street was built westward through Kapalama to Kalihi Street, and the former OR&L line makai of King was now called the Kalihi Line. A new main line ran makai from the downtown depot before intersecting the Kalihi Line just west of Middle Street. The Kalihi line appears to have been abandoned in the late 1920s.

Kapalama had begun to urbanize with the 1901 establishment of the Kapiolani Tract subdivision by developer William C. Achi. This subdivision was on a grid pattern with about 1200 lots in two north-south rows of blocks. The subdivision extended makai from King Street between Kalihi Street and Puuhale Road. Further urbanization occurred by 1912, with the Bishop Estate Tract that extended east of the Kapiolani Tract to Waiakamilo Road. Queen Street ran west-east through both subdivisions, terminating at Waiakamilo Road. The area of Kapalama between the two OR&L lines and between Waiakamilo Road and Iwilei was planted in sugarcane.¹²

⁴ Hawaiian term for a geographical area that typically extends from the mountains to the sea.

⁵ Lama is the Hawaiian name for the endemic ebony trees, Diospyros. Pālama as defined above. Hawaiian Dictionaries. Accessed June 1, 2020. <http://wehewehe.org/gsd12.85/cgi-bin/hdict?e=q-11000-00---off-0hdict--00-1---0-10-0---0--0direct-10-ED--4--textpukuielbert,textmamaka-----0-11--11-en-Zz-1---Zz-1-home-palama--00-3-1-00-0--4---0-0-11-00-OutfZz-8-00&a=d&d=D131799>.

⁶ Sterling, Elspeth P. and Catherine C. Summers, *Sites of Oahu* (Honolulu: Bishop Museum Press) 1978. p. 319.

⁷ The transformation of Hawaiian traditions of royal land tenure to the codified western practice of private land ownership.

⁸ Sterling and Summers, *Sites*, p. 320.

⁹ Mauka is a Hawaiian word meaning "in the direction of the mountains." Makai is a Hawaiian word meaning "in the direction of the sea."

¹⁰ Mary Kawena Pukui and Samuel H. Elbert and Esther T. Mookini, *Place Names of Hawaii* (Honolulu: University of Hawaii Press) 1974. p. 166.

¹¹ Monsarrat, M.D. map "Honolulu, Hawaiian Islands," 1897.

¹² "Cost of Big Drain Project is Set High," *Honolulu Advertiser*, November 14, 1924. p. 1.

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West Queen Street Extension (Dillingham Boulevard) and the Kapalama Canal Bridge

By 1922 the City and County of Honolulu had plans to fill this vacant area with a grid of streets, centered around the extension of Queen Street from Waiakamilo Road, to an intersection with King Street at Liliha Street. This was referred to as the West Queen Street Extension¹³ and would eventually become Dillingham Boulevard. By the end of the 1920s, the City and County had laid down a solid roadbed of fill along this route and installed sewer lines. An article in the Honolulu Star Bulletin reported that in February of 1930, the City and County of Honolulu was still waiting for this fill to settle before surfacing the roadway and installing its curbs, walkways, and lighting.¹⁴ This additional work for 4300 feet of roadway was anticipated to be contracted in the summer of 1930, and was estimated to cost \$180,000.

The Honolulu Star Bulletin also reported that in 1930 the City and County planned a canal (Kapalama Drainage Canal) to join the area's two streams (Kapalama Stream and Niuhelewai Stream) at a cost of about \$750,000, to "fill the same purpose as the Ala Wai."¹⁵ Earth from the dredged canal would fill nearby low lying land. The 110-foot Kapalama Canal Bridge was planned to span the planned Kapalama Drainage Canal at a cost of about \$35,000. However, the bridge was completed years before the canal was even begun. When built, the bridge spanned Niuhelewai Stream and perhaps some portion of adjoining wetlands until the canal was dredged.

The contractor for the Kapalama Canal Bridge is unknown. The engineers were Daniel Balch and George K. Dawson.¹⁶ At the time of the bridge's construction, Daniel Balch was Assistant to City and County Engineer Louis S. Cain, and George Dawson was a structural engineer for the City and County. Balch began his career in 1915 as an engineer for the Territorial Harbor Board.¹⁷ In 1925 he began work for the City and County of Honolulu as assistant engineer to Louis Cain. (Balch followed Cain to the Territorial Department of Public Works as assistant Superintendent in 1935 when Cain became Superintendent. Balch became Superintendent upon Cain's death in 1940 and retired in 1943.¹⁸) Little is known about George Dawson, except that he was engineer for the 1932 steel through-deck Karsten Thot Bridge over the Wahiawa Reservoir,¹⁹ as well as the 1932 Queen Street Bridge (Nuuanu Stream), both on Oahu.

In early October 1930, the City and County Board of Supervisors named the new West Queen Street Extension "Dillingham Boulevard," in honor of Benjamin F. Dillingham (1844-1918),²⁰ who had built Oahu's first railroad, was responsible for the formation of several sugar plantations, and was associated with the dredging and construction of Pearl Harbor Naval Base. In 1931 Dillingham Boulevard was extended west of Puuhale Road to Pearl Harbor. The full length of Dillingham Boulevard from Honolulu to Pearl Harbor was in place by late October 1931 when it was called "one of Oahu's finest highways."²¹

Another road running in a roughly east-west direction towards Pearl Harbor was the next logical development. The eight-lane Honolulu to Pearl Harbor road (later named Nimitz Highway), which began at Waiakamilo Road and terminated at Pearl Harbor, was soon built makai of Dillingham Boulevard.

¹³ City Planning Commission, City and County of Honolulu, map "Proposed Street Plan Kapalama Section," December 1922.

¹⁴ "Contract for Queen Street Work Will Be Let This Summer," *Honolulu Star Bulletin*, February 1, 1930. Sec. 2, p. 1.

¹⁵ *Ibid.*

¹⁶ Thompson, Historic Bridge Inventory Oahu, VII-13.

¹⁷ "Daniel Balch New Chief of Public Works," *Honolulu Star Bulletin*, September 17, 1940.

¹⁸ "D.F. Balch," obituary, December 19, 1961.

¹⁹ Heritage Center, School of Architecture, UH Manoa, State of Hawaii, Historic Bridge Inventory and Evaluation (Draft prepared for the State of Hawaii, Department of Transportation, Highways Division) 2008. p. V-43.

²⁰ "Memory of B.F. Dillingham Honored By Supervisors In Naming New Boulevard," *Honolulu Advertiser*, October 8, 1930, 1.

²¹ "Dillingham Boulevard Is One Of Oahu's Finest Highways," *Honolulu Star Bulletin*, October 31, 1931. Sec. 3, p. 1.

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Construction for it began in July 1941, but it took many years to complete. Delays were due partly to the fact that during World War II a rail line located along this corridor was in heavy use. Only after the war did a preference for trucking lead to the closure of railroads. Following the war, the necessary parcels along the corridor were acquired and construction on the road resumed. Nimitz Highway, finally completed in 1949, "cost the federal government \$1,388,000, with lesser funding amounts provided by the Territory of Hawaii and the City & County of Honolulu."²² Once complete, Nimitz Highway replaced Dillingham Boulevard as the main corridor in this vicinity.

Kapalama Drainage Canal

The potential commercial value of the low-lying land of the Kapalama area makai of King Street was understood since at least the early 1920s. In 1923-24, the Territorial Board of Health condemned as unsanitary almost 58 acres in this area. The board ordered the land filled, and by June 30, 1924 approximately eleven acres had been filled with spoils from the dredging of the harbor slip between Piers 16 and 17. An additional eleven acres was contracted to be filled by the Hawaiian Dredging Co and paid for from the territorial sanitation fund. The 1924 Annual Report of the [Territorial] Department of Public Works stated, "this district is being gradually converted into an industrial center of considerable magnitude and these filling operations have converted practically worthless swamp lands into property selling as high as \$30,000 per acre."²³ During 1924-25, little fill was added to the condemned land because of the unavailability of fill material within pumping distance of the project. However, when Kapalama Basin in Honolulu Harbor was dredged (1925-1926), the remaining acreage was raised to grade level using that fill. In mid-1926 the "entire district [was] being gradually converted into an industrial center of considerable magnitude."²⁴

The City and County of Honolulu began planning a drainage system to prevent heavy rains from inundating the filled acreage. In August 1924, city planning engineer Capt. Charles Welsh submitted a drainage plan for what would become the Kapalama Drainage Canal to the City Planning Commission.²⁵ Welsh's plan called for an open canal, five feet deep and 100 feet wide, extending about 4000 feet mauka from Kapalama Basin slightly west of Niuhelewai Stream. At the mauka point (near the mauka side of Vineyard Street extension), the original plan had the canal curving to the northwest before branching into two open drains. One of these branches extended northwest to Houghtailing Road and then near School Street and Kapalama Avenue. The other branch ran northeast to School Street and became a (closed) box drain extending up Houghtailing Street to Konia Street.

This initial plan contained the basis for the final design of the Kapalama Drainage Canal system in that it "combines the two streams which now meander across Palama district into one channel through the lowest section of that area. The combination of these two streams into a single channel also permits the full development of the maximum amount of land in that portion of the city. It also provides a minimum amount of drainage sewers to be maintained from public funds."²⁶

²² Mason Architects, Inc, Nimitz Highway Improvements Project Historic Resources Survey Phase II (Prepared for Parsons Brinckerhoff, Inc.) 2005. p. 16.

²³ Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1924* (Honolulu: Honolulu Star Bulletin) 1925. p. 10-11.

²⁴ Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1926* (Honolulu: Honolulu Star Bulletin) 1927. p. 6.

²⁵ "Captain Charles R. Welsh Submits First Report To City Planning Commission On Drainage Plan For Kapalama District," *Honolulu Advertiser*, August 10, 1924, p. 12.

²⁶ "Capt. Welsh Submits Report," *Honolulu Advertiser*, August 10, 1924, p. 12.

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In November 1924, the City and County altered Welsh's original plan by adding a branch to the area of the insane asylum at School and Liliha Streets, and a branch to Kamehameha School (present Bishop Museum).²⁷ The depth of the large canal at the lower section was increased to about nine feet, and the projected cost of the project was \$837,000. Although Welsh's original plan in August pointed out the development potential of draining this area, an additional road across Palama was needed to alleviate the congestion on King Street. This additional road was the West Queen Street Extension (later Dillingham Boulevard), but "it would be useless to build a new street on fresh fill across this land unless the flood waters coming down from the mountains were taken care of first."²⁸

Although the Honolulu Advertiser asserted in November 1924 that the Queen Street extension "cannot be done until a drainage canal is constructed"²⁹ the City and County had different ideas; the Kapalama Canal Bridge and the West Queen Street Extension/Dillingham Boulevard were completed in 1930-31, at least six years before the Kapalama Drainage Canal was started.

The canal got underway sometime in late 1937 to early 1938. A Works Progress Administration (WPA) grant of \$310,000 partly funded the \$670,000 project; the remaining money came from bond sales of \$300,000 and reserves from the city's flood control fund.³⁰

The Hawaiian Contracting Company of Honolulu (a Dillingham company) completed the Kapalama Drainage Canal in February 1939 in just under a year. The shape and configuration of the final drainage system includes a canal extending mauka from Kapalama Basin along the approximate contour of Niuhelewai Stream, to about Vineyard Street where narrower branch channels extend to School Street and Kapalama Avenue, School and Houghtailing Streets, and School and Liliha Streets. When completed, the system contained 2.6 miles of canal and other drainage structures and drained an area of 1,145 acres.³¹

Tee-Beam Bridges On Oahu

Concrete tee-beam bridges are the most common type of extant pre-World War II bridges in the state of Hawaii.³² They are a part of the evolution of reinforced-concrete deck bridge technology in Hawaii that began with the first slab bridges around 1908. Often County-designed, these early slab bridges frequently consisted of concrete decks replacing older type superstructures on their original abutments, which were often mortared lava rock.

Design of reinforced-concrete bridges progressed rapidly during the first decades of the 20th century.³³ The strength of concrete girder and tee-beam types, and their lower cost, led to their use in locations with short spans, rather than the concrete arched types.

Although the earliest tee-beam bridges in Hawaii date from around 1912, after about 1925 this bridge type became the preferred choice for bridge construction by the Territorial Highway Department. The pattern of reinforcing steel within the girders is the feature that most distinguishes the tee-beam type from other concrete girder bridges. Changing the arrangement of the reinforcing steel in the girders and deck, from the configuration used in earlier concrete girder bridges, serves to structurally join the two and allows

²⁷ "Proposed Kapalama Plan Discussed at Meetings of Planners and Public," *Honolulu Advertiser*, November 16, 1924, p. 14.

²⁸ Ibid.

²⁹ Ibid.

³⁰ "Start Canal at Kapalama in December," and "Kapalama Flood Control Bonds May Be Sold In Issue," *Honolulu Advertiser*, October 1, 1937, p. 1, p. 4. "Delay Seen On Flood Project," *Honolulu Star Bulletin*, October 1, 1937, p. 3.

³¹ "Another Step Forward in Flood Control," *Honolulu Star Bulletin*, February 25, 1939, p. 12.

³² Heritage Center, School of Architecture, UH Manoa, State of Hawaii, Historic Bridge Inventory and Evaluation (Draft prepared for the State of Hawaii, Department of Transportation, Highways Division) 2008. p. I-72.

³³ Parsons Brinckerhoff and Engineering and Industrial Heritage, A Context for Historic Bridge Types, NCHRP Project 25-25, Task 15 (Prepared for the National Cooperative Highway Research Project) October 2005. pp. 2-26.

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the two components to work together; thus tee-beam bridges can efficiently carry a greater load.³⁴ This relatively small change over standard concrete girder construction provided an increased carrying capacity, and the tee-beam type quickly came into wide use, with examples constructed into the 1950s.

Tee-beam bridges in Hawaii generally had parapets with voids, below a reinforced-concrete rail cap. "Several standard rail patterns [were] used by the Territorial Highway Department, either "Greek-cross", arched, or simple rectangular voids."³⁵ Earlier masonry (lava rock or concrete) bridges typically had solid railings.

³⁴ Ibid. p. 3-88.

³⁵ Heritage Center, School of Architecture, UH Manoa, State of Hawaii, Historic Bridge Inventory and Evaluation (Draft prepared for the State of Hawaii, Department of Transportation, Highways Division) 2008. p. I-72.

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9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

No drawings or early photographs of the original 1930 bridge were located for this report.

Historic aerial photographs of the area around the bridge are located at the Hawaii State Archives in folders PPA-48-3, PPA-49-4, and PPA-58-2. Current aerial photo from Google Earth 6.1. Kalihi vicinity. Approximate elevation 3000', Borders and Labels data layer. Available from server kh.google.com. accessed February 21, 2013.

City Planning Commission, City and County of Honolulu, map "Proposed Street Plan Kapalama Section," December 1922.

Heritage Center, School of Architecture, University of Hawaii at Manoa. State of Hawaii, Historic Bridge Inventory and Evaluation. Draft prepared for the State of Hawaii, Department of Transportation, Highways Division. May 2008.

Honolulu Advertiser

"Captain Charles R. Welsh Submits First Report To City Planning Commission On Drainage Plan for Kapalama District." August 10, 1924. p. 12.

"Kapalama Plan." August 15, 1924. p. 11.

"Cost Of Big Drain Project Is Set High." November 14, 1924. p. 1.

"Proposed Kapalama Plan Discussed At Meeting Of Planners and Public." November 16, 1924. p. 14.

"Memory of B.F. Dillingham Honored By Superv. In Naming New Boulevard." October 8, 1930. p. 1.

"Early Start Is Assured on Puuloa Road." March 31, 1931. p. 11.

"Pearl Harbor Traffic Will Get A Break." July 21, 1931. p. 1.

"New Bids For Puuloa Project." September 18, 1931. p. 12.

"Start Canal At Kapalama In December." October 1, 1937. p. 1.

"Kapalama Flood Control Bonds May Be Sold In Issue." October 1, 1937. p. 4.

"Rush Urges Filling Land." December 3, 1939. p. 1.

"Dillingham Blvd. to Open Tuesday." Feb 25, 1940. p. 1.

"Complaint – dirt road ewa of Kapalama Canal." February 6, 1948. Editorial Page.

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Honolulu Star Bulletin

"Contract for Queen Street Work Will Be Let This Summer." February 1, 1930. Sec 3, 1.

"Dillingham Boulevard Is One Of Oahu's Finest Highways." October 31, 1931. Sec. 3, 1.

"Appropriation Is Urged For Flood Control Program." September 28, 1937. p. 12.

"Delay Seen On Flood Project." October 1, 1937. p. 3.

"Another Step Forward in Flood Control." February 25, 1939. p. 12.

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Superintendent of Public Works. *Report to the Governor, Territory of Hawaii, for the Year Ending June 30*. Honolulu: Various publishers. Various years.

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Thompson, Bethany. Historic Bridge Inventory, Island Of Oahu. Prepared for the State of Hawaii, Department of Transportation, Highways Division. June 1983.

Yoklavich, Ann. Pre-Draft Dillingham Boulevard Residences Overview (no HABS No.). Historic American Buildings Survey, National Park Service, Department of the Interior. 2012.

Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

Previous documentation on file (NPS):

- preliminary determination of individual listing (36 CFR 67) has been requested
- previously listed in the National Register
- previously determined eligible by the National Register
- designated a National Historic Landmark
- recorded by Historic American Buildings Survey # _____
- recorded by Historic American Engineering Record # _____
- recorded by Historic American Landscape Survey # _____

Primary location of additional data:

- State Historic Preservation Office
- Other State agency
- Federal agency
- Local government
- University
- Other
- Name of repository: _____

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property Less than one (1) acre

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates

Datum if other than WGS84: _____
(enter coordinates to 6 decimal places)

- 1. Latitude: _____ Longitude: _____
- 2. Latitude: _____ Longitude: _____
- 3. Latitude: _____ Longitude: _____
- 4. Latitude: _____ Longitude: _____

Or

Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
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UTM References

Datum (indicated on USGS map):

NAD 1927 or NAD 1983

- 1. Zone: 04 Easting: 616860 Northing: 2358210
- 2. Zone: Easting: Northing:
- 3. Zone: Easting: Northing:
- 4. Zone: Easting : Northing:

Verbal Boundary Description (Describe the boundaries of the property.)

The boundary of the Kapalama Canal Bridge is defined by the outer limits of the structure, enclosed by a parallelogram measuring approximately 125' x 80' that includes the superstructure and abutments.

Boundary Justification (Explain why the boundaries were selected.)

The boundary of the property includes all historic features of the bridge.

11. Form Prepared By

name/title: Dee Ruzika
organization: Mason Architects, Inc.
street & number: 119 Merchant Street, Suite 501
city or town: Honolulu state: Hawaii zip code: 96813
e-mail dr@masonarch.com
telephone: 808.536.5336
date: _____

Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

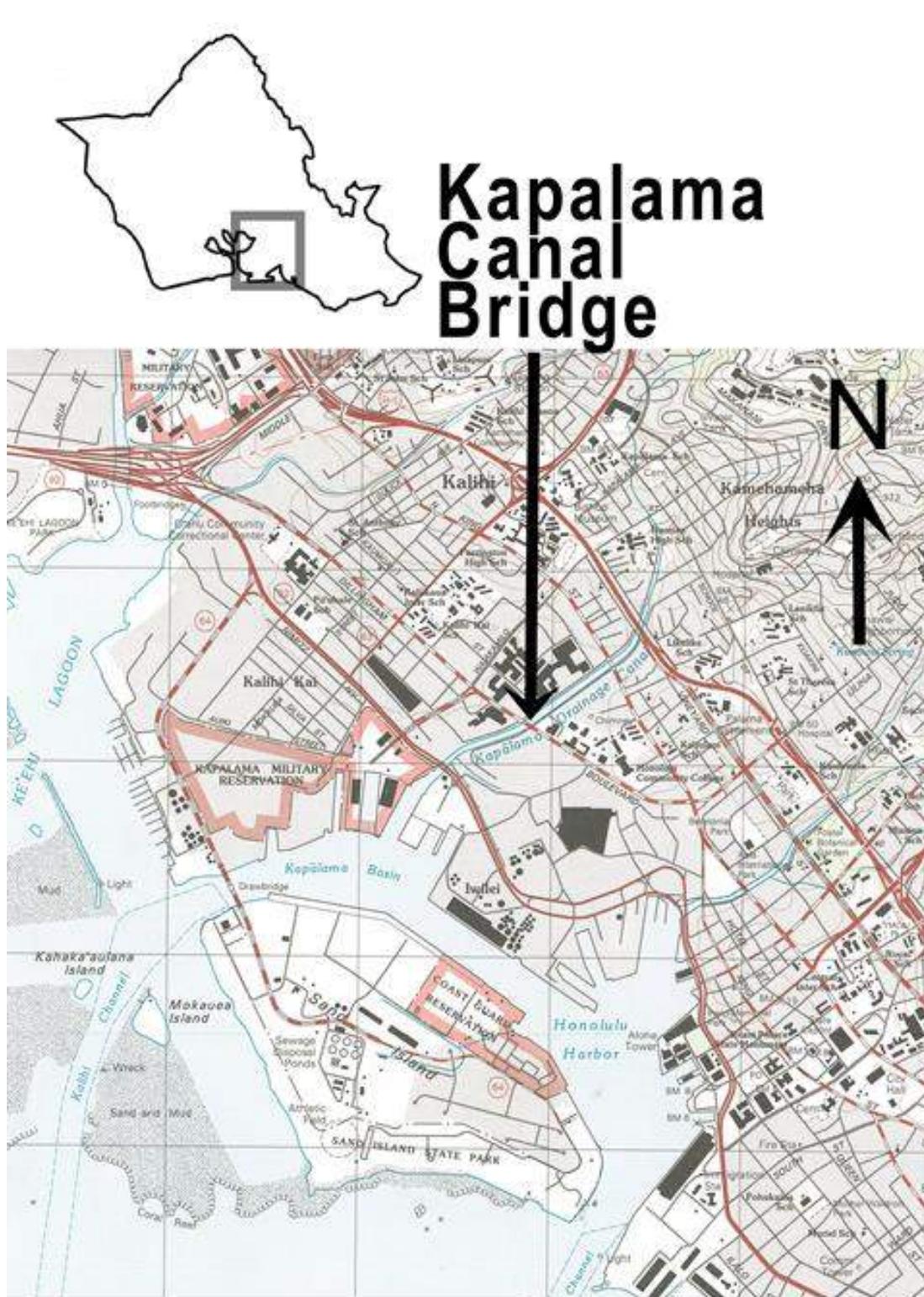
Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)

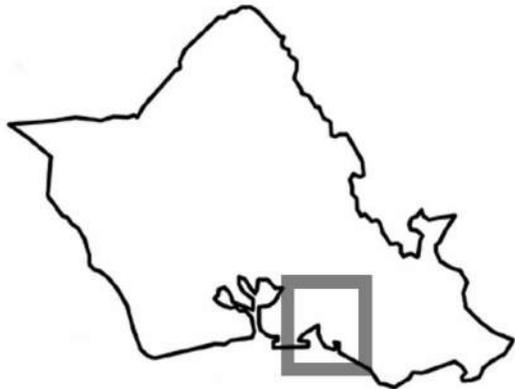
Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

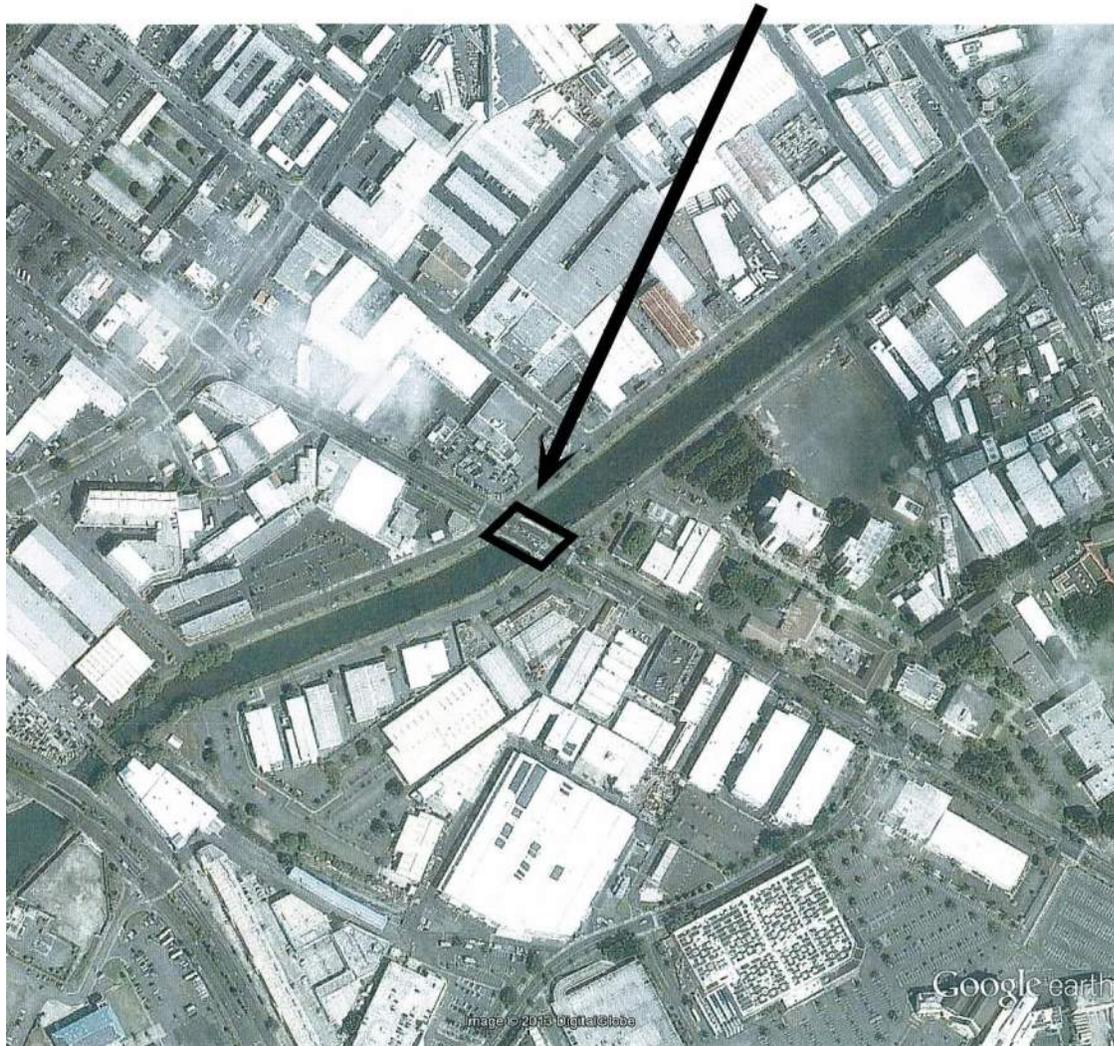


Kapālama Canal Bridge
Name of Property

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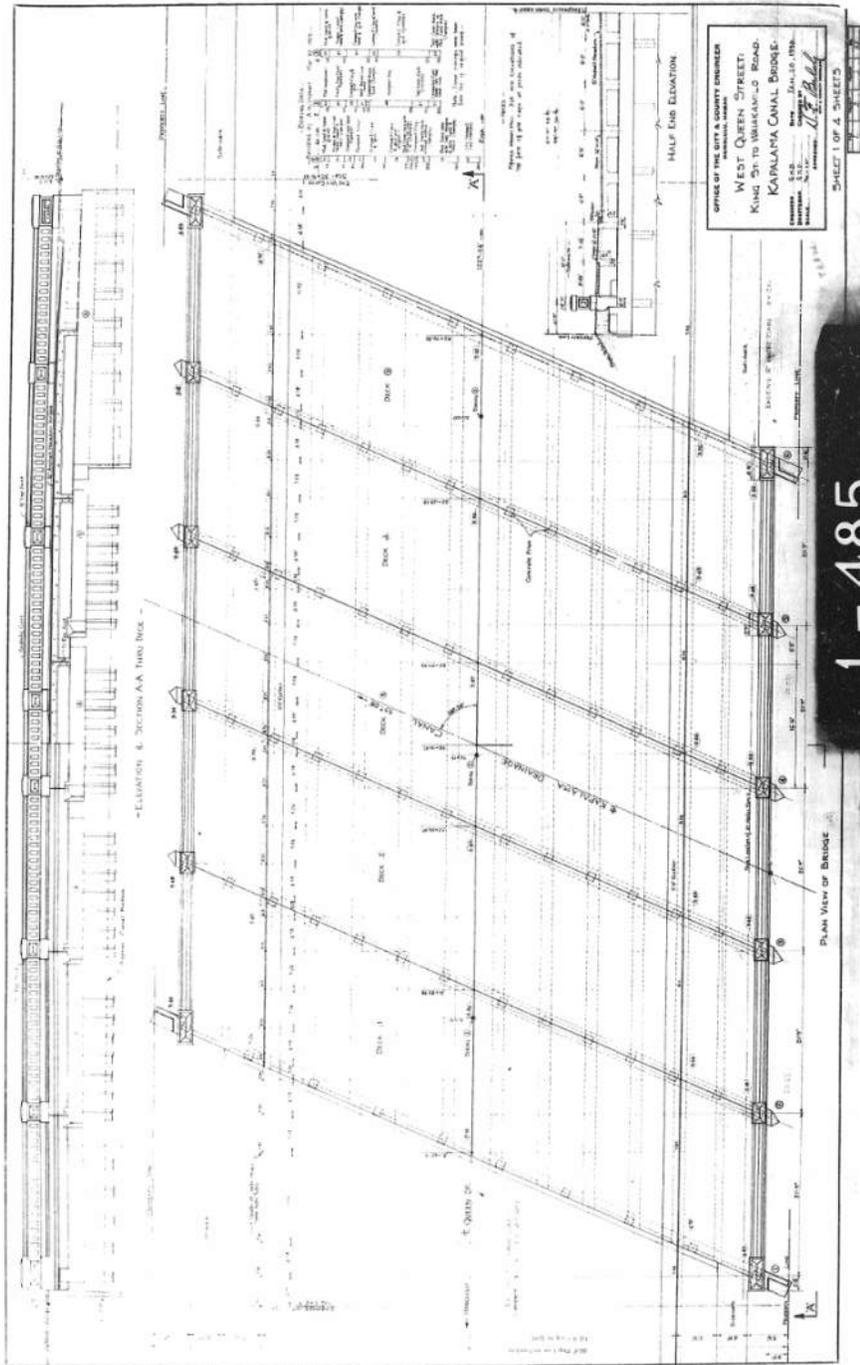
Kapalama Canal Bridge boundary



Kapālama Canal Bridge
Name of Property

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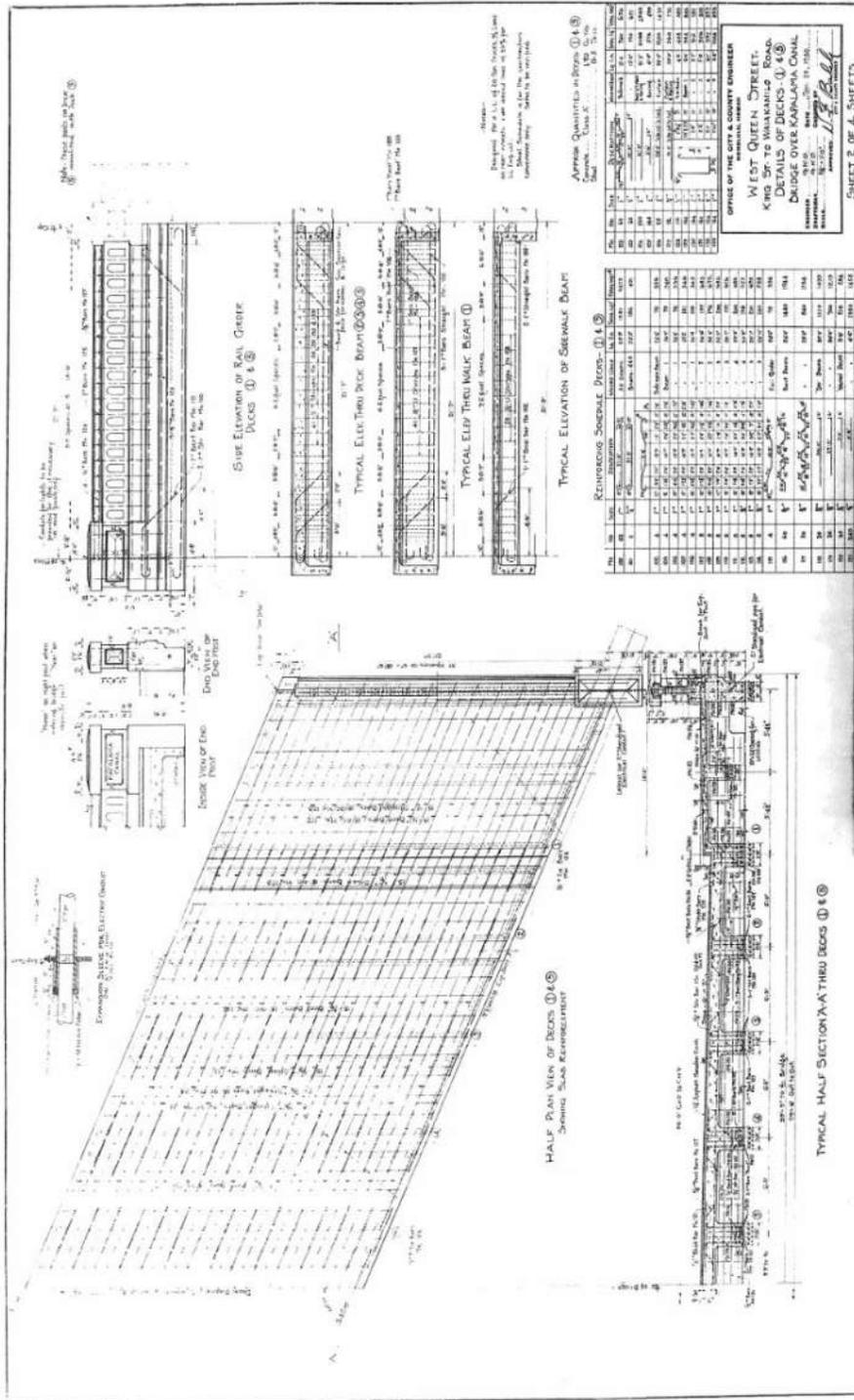
Bridge Over Kapālama Canal, West Queen Street. Office of the City & County Engineer, Honolulu Hawaii'i. January 20, 1930.



Kapālama Canal Bridge
 Name of Property

Honolulu, Hawaii
 County and State

Bridge Over Kapālama Canal, West Queen Street. Details of Decks. Office of the City & County Engineer, Honolulu Hawai'i. January 20, 1930.

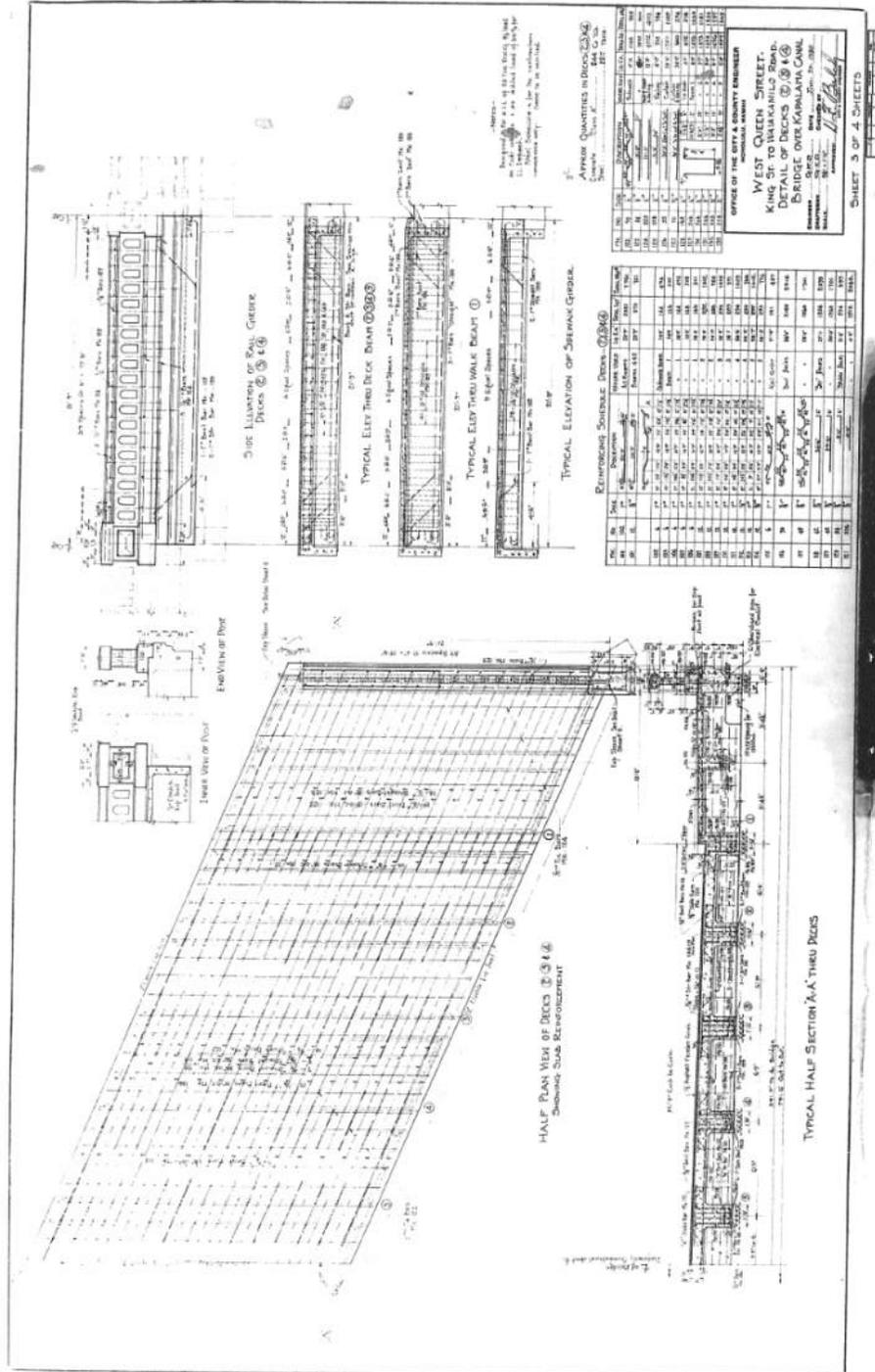


1-486
 1-3-3-56

Kapālama Canal Bridge
 Name of Property

Honolulu, Hawaii
 County and State

Bridge Over Kapālama Canal, West Queen Street. Detail of Decks. Office of the City & County Engineer, Honolulu Hawai'i. January 20, 1930.

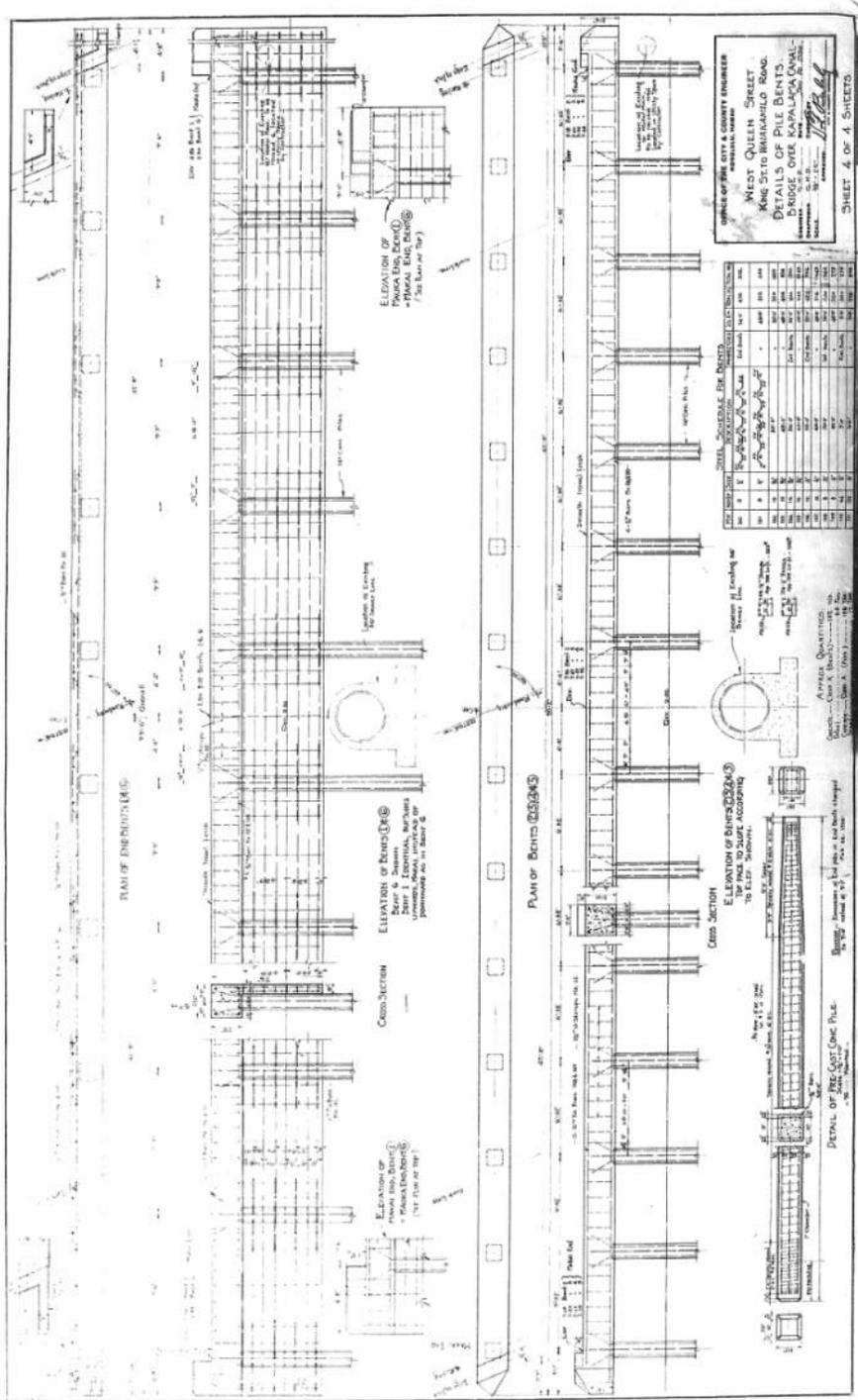


1-487
 1-3-3-57

Kapālama Canal Bridge
 Name of Property

Honolulu, Hawaii
 County and State

King St to Waiakamilo Road, West Queen Street. Detail of Pile Bents. Office of the City & County Engineer, Honolulu Hawai'i. January 20, 1930.



1-488
 1-3-3-58

Kapālama Canal Bridge

Name of Property

Honolulu, Hawaii

County and State

Photographs

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to the photograph number on the photo log. For simplicity, the name of the photographer, photo date, etc. may be listed once on the photograph log and doesn't need to be labeled on every photograph.

Photo Log

Name of Property: Kapālama Canal Bridge

City or Vicinity: Honolulu

County: Honolulu State: Hawaii

Photographer: Dee Ruzika

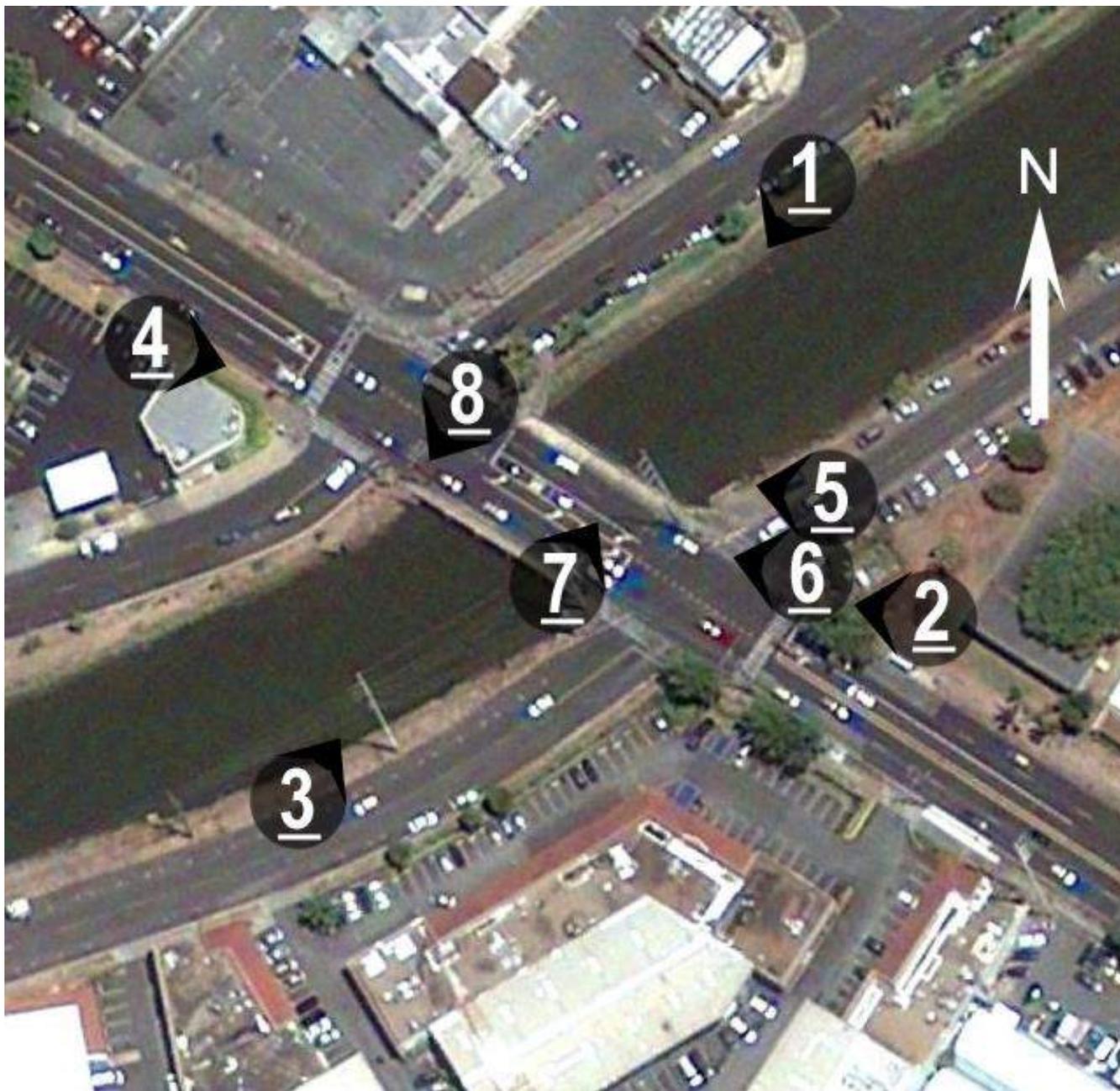
Date Photographed: August 2012

Description of Photograph(s) and number, include description of view indicating direction of camera:

Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

Photo Key



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

PHOTO LOG

Name of Property: Kapalama Canal Bridge
City or Vicinity: Kapalama
County: Honolulu State: HI
Photographer: Dee Ruzicka, Mason Architects, Inc.
Date Photographed: September, 2012
Location of Original Digital Files: Mason Architects, Inc. 119 Merchant St., Honolulu, HI 96813

Photo #1 (HI_HonoluluCounty_KapalamaCanalBridge_0001)
Overview elevation of Kapalama Canal Bridge, camera facing south west.

Photo #2 (HI_HonoluluCounty_KapalamaCanalBridge_0002)
Overview of bridge, camera facing west.

Photo #3 (HI_HonoluluCounty_KapalamaCanalBridge_0003)
Overview elevation of bridge, camera facing north east.

Photo #4 (HI_HonoluluCounty_KapalamaCanalBridge_0004)
Overview of bridge, camera facing east.

Photo #5 (HI_HonoluluCounty_KapalamaCanalBridge_0005)
Oblique view of the outboard side of parapet, camera facing west.

Photo #6 (HI_HonoluluCounty_KapalamaCanalBridge_0006)
Oblique view of the inboard side of parapet and the walkway, camera facing west

Photo #7 (HI_HonoluluCounty_KapalamaCanalBridge_0007)
Detail of typical parapet with measuring tape in 1' graduations, camera facing north east.

Photo #8 (HI_HonoluluCounty_KapalamaCanalBridge_0008)
Detail of typical end stanchion showing inscription camera facing south west.

Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0001



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0002



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0003



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0004



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0005



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0006



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0007



Kapālama Canal Bridge
Name of Property

Honolulu, Hawaii
County and State

HI_HonoluluCounty_KapalamaCanalBridge_0008



Paperwork Reduction Act Statement: This information is being collected for nominations to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.). We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number.

Estimated Burden Statement: Public reporting burden for each response using this form is estimated to be between the Tier 1 and Tier 4 levels with the estimate of the time for each tier as follows:

- Tier 1 – 60-100 hours
- Tier 2 – 120 hours
- Tier 3 – 230 hours
- Tier 4 – 280 hours

The above estimates include time for reviewing instructions, gathering and maintaining data, and preparing and transmitting nominations. Send comments regarding these estimates or any other aspect of the requirement(s) to the Service Information Collection Clearance Officer, National Park Service, 1201 Oakridge Drive Fort Collins, CO 80525.